

Case Study on Atypical Pneumonia Zoonosis Infection

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Abstract

Case study of lower respiratory tract infection caused by certain respiratory pathogens.

Key words: atypical chest infection, pneumonia, human psittacosis

Background

Atypical pneumonia is referred to as lower respiratory tract infections that are caused by certain respiratory pathogens including *Chlamydia psittaci*, *Francisella tularensis*, *Coxiella burnetii*, *Chlamydia pneumoniae*, *Legionella* species, and *Mycoplasma pneumoniae*. Atypical pneumonias are broadly classified into zoonotic and non-zoonotic atypical pneumonias. Zoonotic infections include psittacosis (*Chlamydia psittaci*), Q fever (*Coxiella burnetii*), and tularaemia (*Francisella tularensis*). Zoonotic atypical pneumonia is characterized by both pulmonary and extrapulmonary systemic infectious disease.

Organisms responsible for zoonotic atypical pneumonia include psittacosis transmitted via psittacine birds and Q fever via contact with parturient cats and in sheep-raising areas [2].

Case Presentation

A 35-year-old Asian male presents with myalgia, fever, chills, headache, non-productive cough, and respiratory distress. He has a history of contact with an infected bird a few days back in the poultry processing plant. The individual is suspected to have acquired the disease by inhaling contaminated aerosols or dust contaminated by dried fecal matter of the infected bird. The patient also presents with extrapulmonary symptoms that include gastrointestinal disturbances including vomiting and diarrhea, myocarditis, and encephalitis.

Chest examination of this patient reveals crackling breathing sounds. The occurrence of extrapulmonary symptoms and occupational exposure to animals was indicative of atypical pneumonia in this patient. Therefore, serum samples were sent to the lab for further testing and identification of the causative organism. During this period, empirical antibiotic therapy was administered to the patient. The serologic test results of this patient are given in the following table.

	02/03/2022	12/03/2022	Reference Range
Chlamydia IgA (ELISA)	POSITIVE	POSITIVE	
Chlamydia IgG (ELISA)	POSITIVE	POSITIVE	
C. trachomatis IgG (MIF)	130	260	<128
C. pneumonia IgG (MIF)	260	260	<1024
C. psittaci IgG (MIF)	130	260	<128

How long does it take for the symptoms to appear?

The incubation period of *C. psittaci* birds is 3 to 10 days whereas, in humans, the incubation period is 5 to 28 days long. Human psittacosis symptoms follow the incubation period [3].

Who is at an increased risk of Zoonotic Atypical Pneumonia?

In the case of human psittacosis, individuals with occupational or recreational exposure to psittacine birds are at an increased risk of developing this disease. These individuals include workers at poultry processing plants, avian quarantine workers, pet bird owners, zoo veterinarians, bird fair visitors and pet shop workers [3].

What are the Signs and Symptoms of Atypical Pneumonia in Human Psittacosis?

Pulmonary symptoms of human psittacosis include dry cough as well as rales and rhonchi upon lung auscultation. The physician may also observe a pleural rub. Fever and relative bradycardia, also known as pulse-temperature dissociation is also observed in these patients. Extrapulmonary symptoms in these patients include arthralgia, gastrointestinal disturbances, photophobia, deafness, epistaxis, and tinnitus [3, 4].

How is the diagnosis made?

Diagnosis of zoonotic atypical pneumonia is based on clinical features and serum diagnostic evaluation. Serological tests are important for confirming the clinical diagnosis and include micro-immunofluorescence test (MIF), enzyme-linked immunoassay (ELISA), and complement fixation (CF) tests. However, these tests do not confirm the presence of *C. psittaci* species in the serum sample owing to cross-reaction between different species of the *Chlamydia* genus. This required PCR testing of the patient's sputum sample or throat swab. Empirical antibiotic therapy before serologic testing may result in false antibody tests presenting as negative chlamydial IgG and IgA in the serum. Other diagnostic tests for *C. psittaci* include elevated tube agglutination tests (TA). Systemic biochemical markers of human psittacosis include the following [3, 4, 5].

1. Normal leukocyte levels with a left shift
2. Elevated erythrocyte sedimentation rate (ESR)
3. Elevated C-reactive protein (CRP)
4. Abnormal liver enzymes
5. Hyponatremia
6. Elevated blood urea nitrogen to creatinine ratio

What does the Radiologic Imaging of the patient show?

The chest x-ray in these patients reveals patchy lesions and infiltration on the lungs. In most cases, single lower lobar changes are observed, however, variable presentations are reported. Computed tomography (CT) scans have a relatively higher sensitivity for atypical pneumonia in human psittacosis. CT scans reveal nodular pulmonary infiltrates that are surrounded by ground-glass opacities [3, 4].

What are the complications of Human Psittacosis?

Aside from atypical pneumonia, respiratory failure, and other pulmonary complications caused by *C. psittaci* infection, human psittacosis may also manifest as hepatitis, encephalitis, myocarditis, endocarditis, arthritis, and sepsis. Prompt and adequate treatment not only reduces the risk of developing these complications but also lowers the mortality to only 1% as compared with untreated individuals [4].

What is the Treatment of Choice for Human Psittacosis?

The antibiotics included in the human psittacosis treatment regimen include the following.

1. Tetracycline hydrochloride 500 mg four times a day or doxycycline 100 mg twice for 10 to 21 days is the treatment of choice for human psittacosis.
2. Minocycline is a second-generation tetracycline that is effective against *C. psittacosis* infection. Minocycline has a minimum inhibitory concentration of 90% at the concentration of 0.06 mg/L.
3. Erythromycin serves as an alternate treatment for human psittacosis, however, is less efficacious compared to other drugs. Therefore, erythromycin is not favoured when treating pregnant women.
4. Azithromycin is favoured over erythromycin and the dosage regimen is 250 to 500 mg once a day.

While tetracycline is the drug of choice, macrolides (azithromycin and erythromycin) serve as the second-line of treatment and are primarily used in children. The majority of psittacosis patients respond to antibiotic therapy within 24 hours of initiation of the treatment. The mortality of human psittacosis drops to only 1% with adequate treatment, while untreated cases have a mortality of 15-20% [3, 4].

What is the prognosis of Human Psittacosis?

The prognosis of this disease depends on several factors. These include the patient's health status before the infection, the severity of the disease, prompt diagnosis and adequate treatment. Complete recovery of human psittacosis takes place in approximately 6 to 8 weeks. Follow-up chest x-rays also reveal residual changes. The following chest x-ray is of a 44-year-old male diagnosed with zoonotic atypical pneumonia caused by *C. psittaci* [3, 4].





What are the preventive measures for Human Psittacosis?

With the severe onset and fatal nature of human psittacosis, adequate treatment and prevention measures must be taken. According to the Centers for Disease Control and Prevention, one should buy pet birds from a renowned and reputed store. Moreover, one should follow good hygiene and precautions while handling birds and/or cleaning their cages. This includes the use of gloves and masks to avoid the contraction of this infection.

Other preventive measures include the following [6, 7].

1. One should clean bird cages as well as food and water on a daily basis.
2. One should position multiple cages in such a way to avoid the spread of food, droppings, and feathers between them.
3. One should avoid the over-crowding of birds.
4. One should isolate the birds and treat those that are infected.

Does prior psittacosis protect from future infections?

The body develops long-term immunity against many viral and bacterial infections. However, in the case of human psittacosis, the person may develop the disease despite prior exposure to *C. psittaci*. Therefore, constant care must be taken, particularly for those individuals who are at an increased risk of developing this disease [6].

Key points

- Human psittacosis or parrot fever is a zoonotic infection caused by *C. psittaci*.
- The incubation period is 3-10 days in birds and 5-28 days in humans.
- Individuals with occupational exposure to psittacine birds are at an increased risk of developing psittacosis.
- Signs and symptoms of human psittacosis include dry cough, temperature-pulse dissociation, fever, chills, malaise, arthralgia, and gastrointestinal disturbances.
- Diagnosis is based on clinical findings, history of exposure to infected animals, and serologic testing.
- Tetracycline is the first line of treatment while macrolides such as azithromycin and erythromycin are the second line of treatment.
- The complications of human psittacosis include atypical pneumonia, endocarditis, encephalitis, hepatitis, and sepsis.
- Human psittacosis has 1% mortality in treated individuals.
- Individuals should take preventive measures including adequate hygiene while handling pets and cleaning cages.

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